

## **6. DEMOGRAPHY AND TRENDS IMPACTING RAIL NEEDS**

This section discusses national and Virginia growth trends for population and freight. Growth trends form part of the analytical framework in establishing passenger and freight needs for the Commonwealth for use in the development and evaluation of potential rail improvement projects (CFR Sec. 266.15 FRA Requirements for State Rail Plan – [c.1] data sources and analytical methodology).

### **6.1. FRA Requirements**

This Chapter of the Virginia Statewide Rail Plan (VSRP) presents information related to Virginia's Transportation Network in the context of the national system. This is not a requirement of 49 CFR § 266.15

### **6.2. Population**

#### **6.2.1. National**

Transportation, including passenger rail and freight rail needs, is driven by a number of key factors. The primary factors are population density and growth trends for the future. The U.S. population in the 2000 Census was 281,421,906. The population estimate in 2008 was 304,059,724 – an average growth rate of approximately 1.03 percent. The population density for 2007 is shown in Figure 6-1. The population density in Figure 6-1 compares favorably with the East Coast Megaregions previously discussed. According to the U.S. Census Bureau, the nation's population is projected to be approximately 378 million by 2035, and 420 million by 2050.

#### **6.2.2. Virginia**

The population in Virginia in the 2000 Census was 7,104,078. Projections of growth in the Commonwealth are shown in Figure 6-2 below. Commuting patterns of the labor force are shown in Figure 6-3. The estimated population density in Virginia in 2007 is shown in Figure 6-4. As expected, the concentration is heaviest in the metropolitan regions of Washington, D.C., Richmond, and Hampton Roads. These regions are connected by I-64 and I-95 transportation corridors. These two corridors intersect to form a “crescent”, and hence this geography has been named the Crescent Corridor.

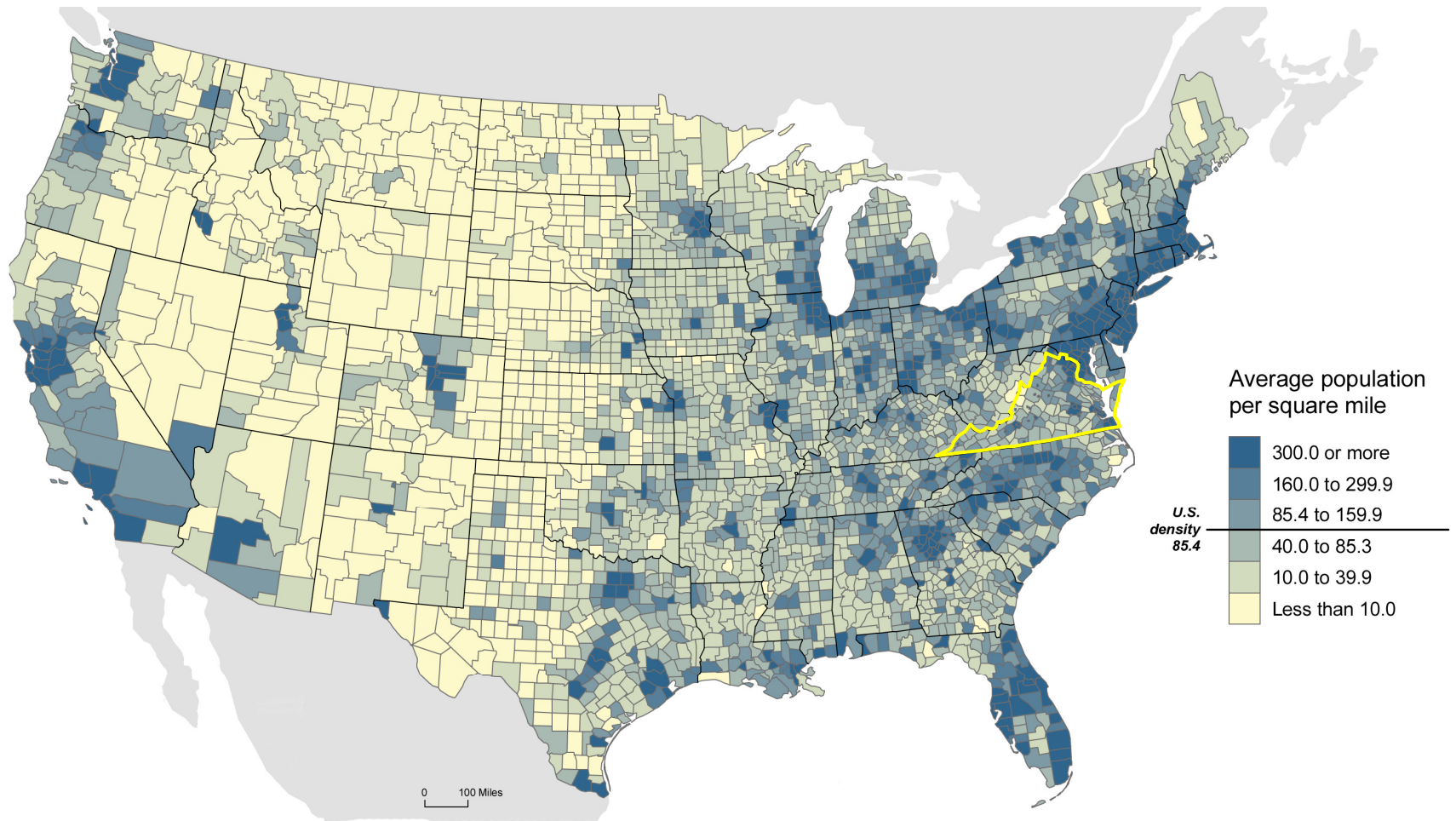
Figure 6-5 shows increase in population across the Commonwealth. The largest increases are within the Crescent Corridor. A projected increase in population is also observed along the I-81 corridor.

### **6.3. Growth Trends**

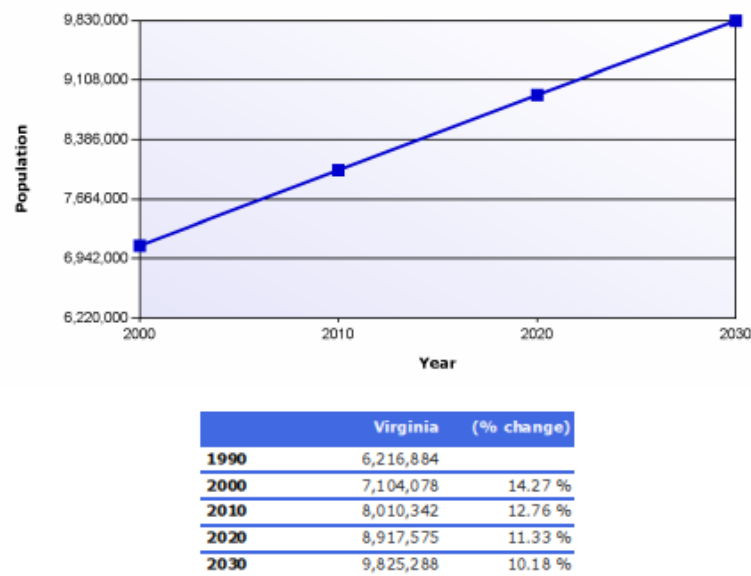
#### **6.3.1. National Trends**

According to the recent report, *America 2050-A Prospectus*, most of the nation's rapid population growth, and an even larger share of its economic expansion, is expected to occur in 10 or more emerging megaregions: large networks of metropolitan regions, mega-regions cover thousands of square miles and are located in every part of the country. See Chapter 3 for discussion of megaregions. Virginia is part of, and a vital transportation link spanning between the megaregions of the East Coast. The emerging megaregions are defined by

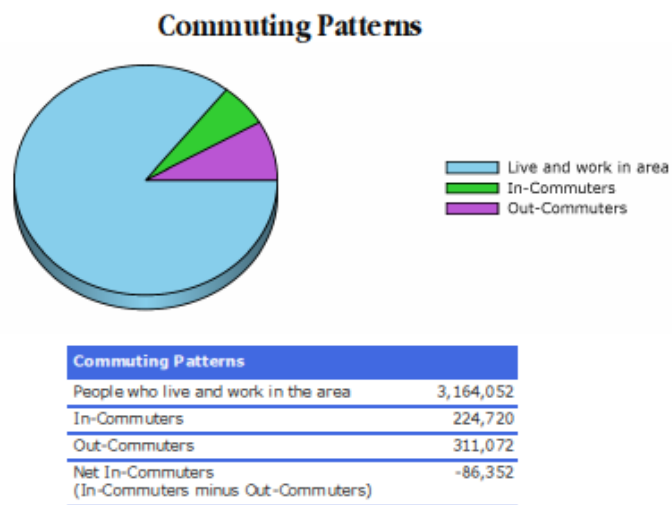
layers of relationships that together define a common interest. This common interest then forms the basis for policy decisions. The five major categories of relationships that define megaregions are: 1) environmental systems and topography; 2) infrastructure systems; 3) economic linkages; 4) settlement patterns and land use; and 5) shared culture and history.



**Figure 6 - 1 U.S. Population Density (2007)**  
(Source: U.S. Census Bureau)

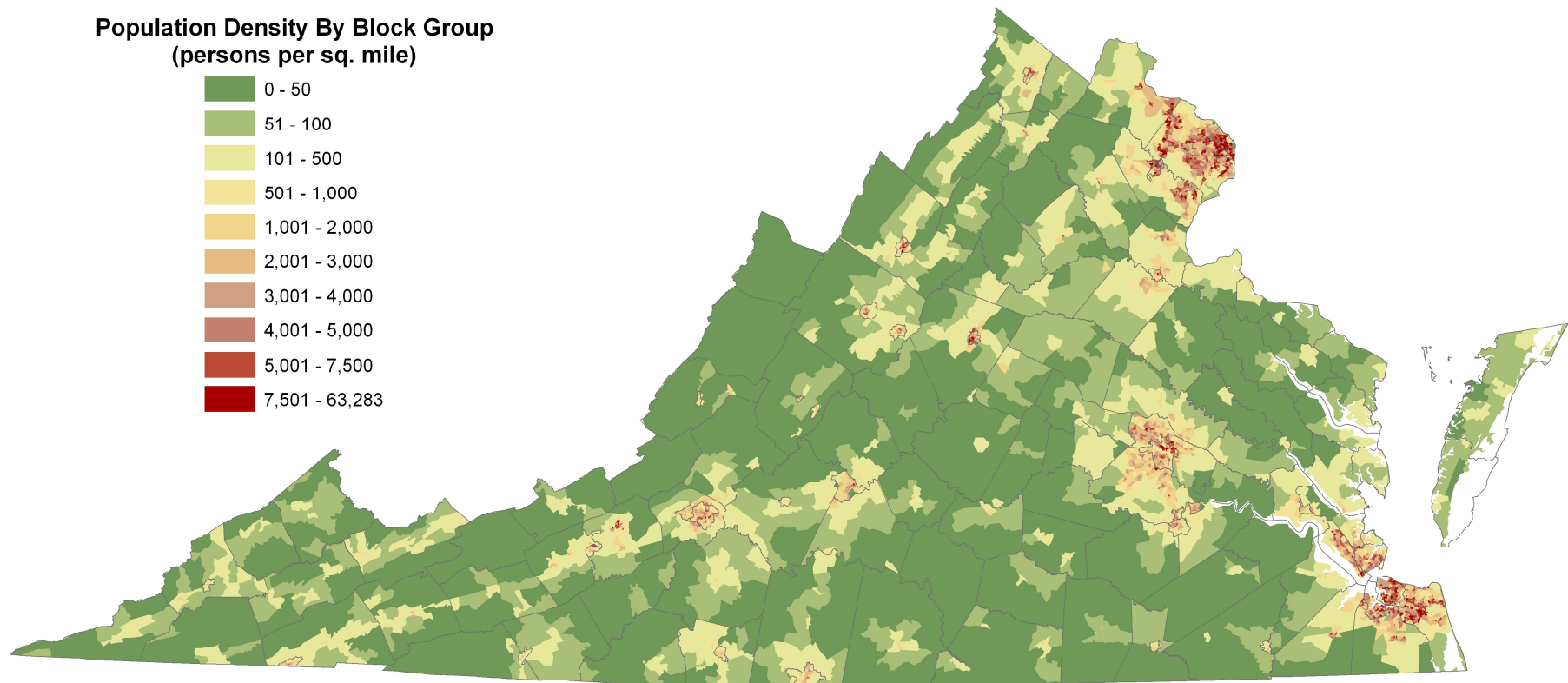


**Figure 6 - 2 Population Change Projects for Virginia**  
(Source: Virginia Employment Commission)

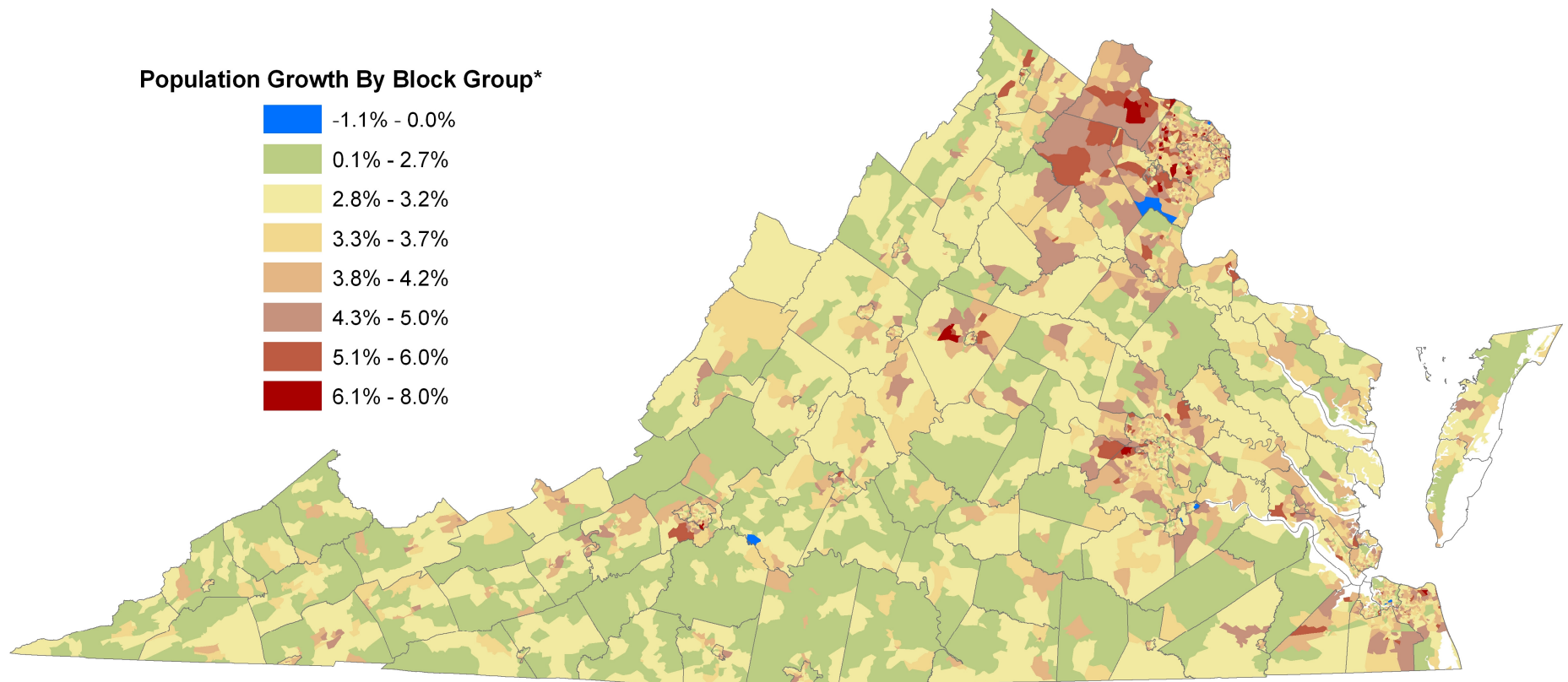


**Figure 6 - 3 Commuting Patterns in Virginia**  
(Source Virginia Employment Commission)





**Figure 6 - 4 Population Density in Virginia (2007)**  
 (Source: Environmental Research Institute / U.S. Census Bureau)



**Figure 6 - 5 Forecasted Population Growth Rate in Virginia : 2007 - 2012**  
(Source: Environmental Research Institute)

Challenges, such as transportation, span across multi-state regions and cannot be solely solved at the state level. One example of a challenge that requires coordination at the megaregional scale is the challenge of moving goods efficiently from coastal ports through congested metropolitan areas to reach inland destinations. The *America 2050* report states that one way megaregions can prepare for future population pressures is by marshalling resources to make major investments in high speed rail and other mobility infrastructure; protecting environmental resources; coordinating economic development strategies; and making land use decisions that encompass all of these.

*America 2050* identified six major trends that will shape America's future. Taken together these trends provide the need for a national strategy to meet new challenges. These trends are: 1) new global trading patterns; 2) rapid population growth and demographic change; 3) inefficient land use; 4) uneven and inequitable growth patterns within and among regions; 5) the mounting energy crisis and global climate change; and 6) metropolitan infrastructure that is reaching the limits of its capacity.

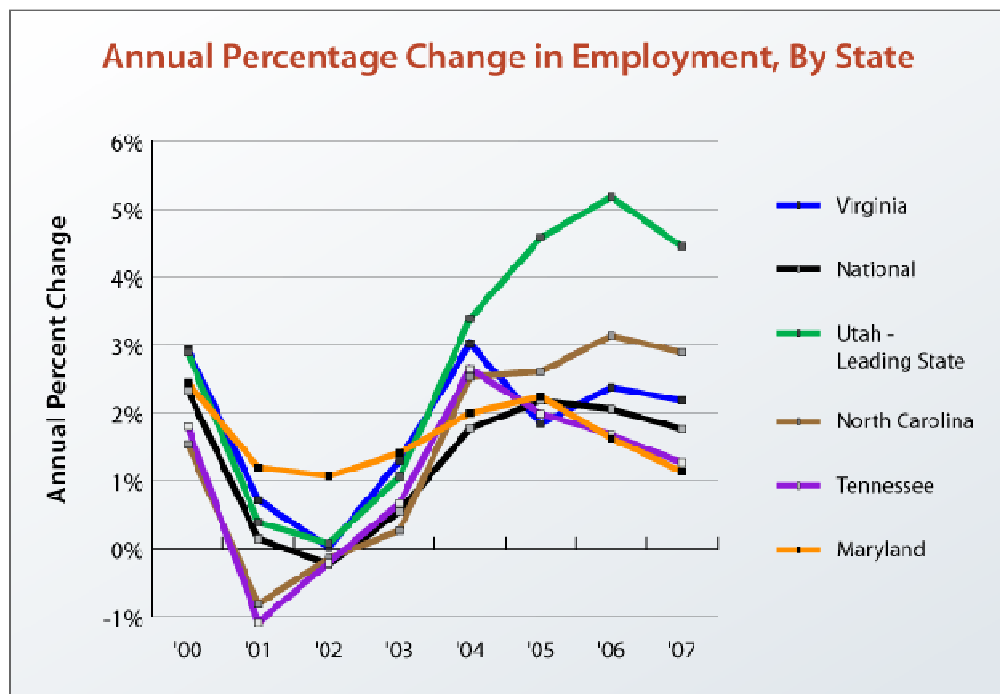
### **6.3.2. Virginia Trends**

The Commonwealth has consistently rated as one of the fastest growing and best states for business. Virginia is strategically located within the nation's transportation network - Dulles International Airport and the Port of Virginia are important international gateways, Interstates-95 and 81 represent major north-south arteries for the flow of people and goods throughout the eastern U.S., and I-64 and Route 460 serve east-west passengers and carry freight to and from the port. Close proximity to the nation's capital is advantageous and Virginia's educational institutions are widely respected as some of the best in the nation. In 2006 and 2007, *Forbes.com* rated Virginia as the best state for business. Accordingly, it should be no surprise that the Commonwealth is experiencing increased population and employment growth.

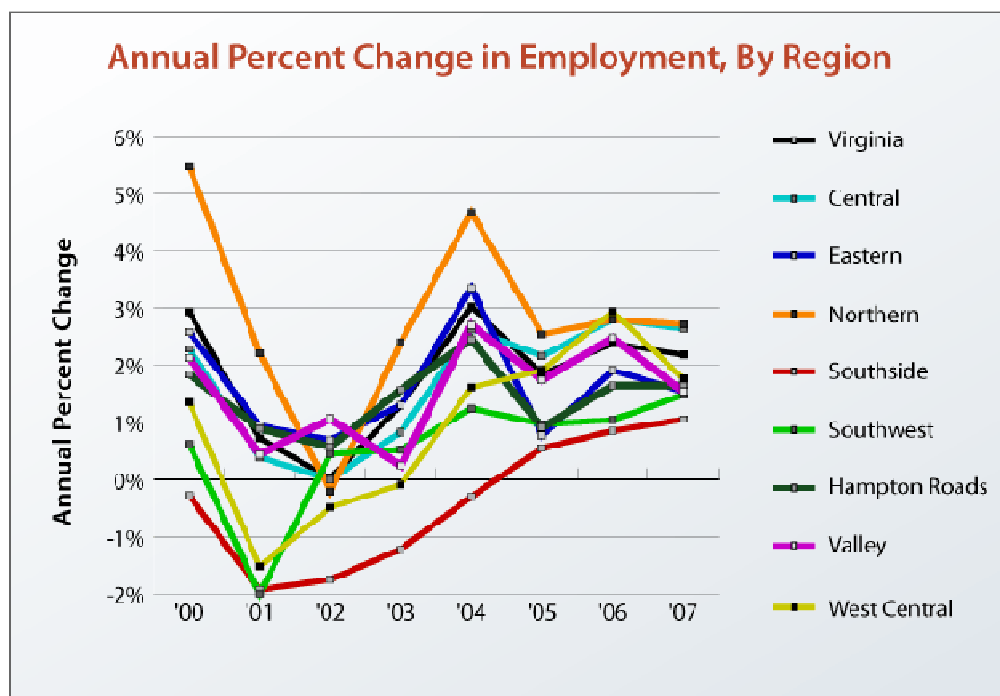
According to the Virginia Employment Commission, between 2007 and 2030, Virginia's population will experience an increase from the current 7.5 million to approximately 9.8 million (30 percent increase). The accompanying increase in households and workforce would be expected to be similar. It is estimated that half of these persons will require creation of new jobs. This is compared with the national population over the same time period that will increase from an estimated 308.9 million persons in 2007; to 323.5 million persons in 2030 (5 percent increase).

According to the Commonwealth's *Virginia Performs* statistics, from 2005 to 2007, Virginia's employment growth rate was ranked 18th in the nation at 2.18 percent, which was less than half of that of Utah (4.5 percent), the fastest growing state in the nation. North Carolina (2.9 percent) grew at a faster rate as shown in Figure 6-6. Virginia, however, grew at a faster rate than Tennessee (1.2 percent) and Maryland (1.1 percent). The national employment growth was 1.8 percent.

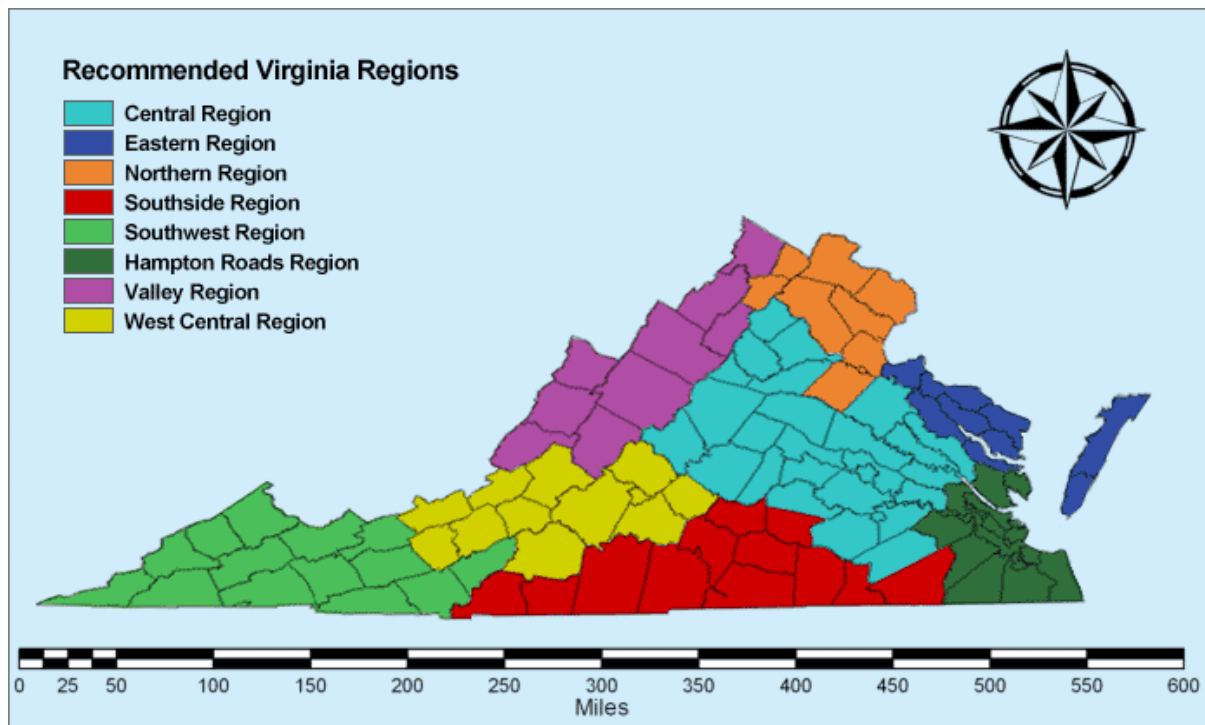
With regard to regional employment growth, data in 2007 indicates that the Northern region (2.71 percent) was the fastest growing region in the state over the previous year as shown in Figure 6-7. The West Central region exhibited a growth rate of 1.76 percent while the Central region registered 2.64 percent. Virginia's remaining regions all saw rates at or below 1.64 percent. The regions of Virginia are shown in the graphic found in Figure 6-8.



**Figure 6 - 6 Annual Percentage Change in Employment by State**  
(Source: *Virginia Performs*)



**Figure 6 - 7 Annual Percentage Change in Employment by Virginia Region**  
(Source: *Virginia Performs*)



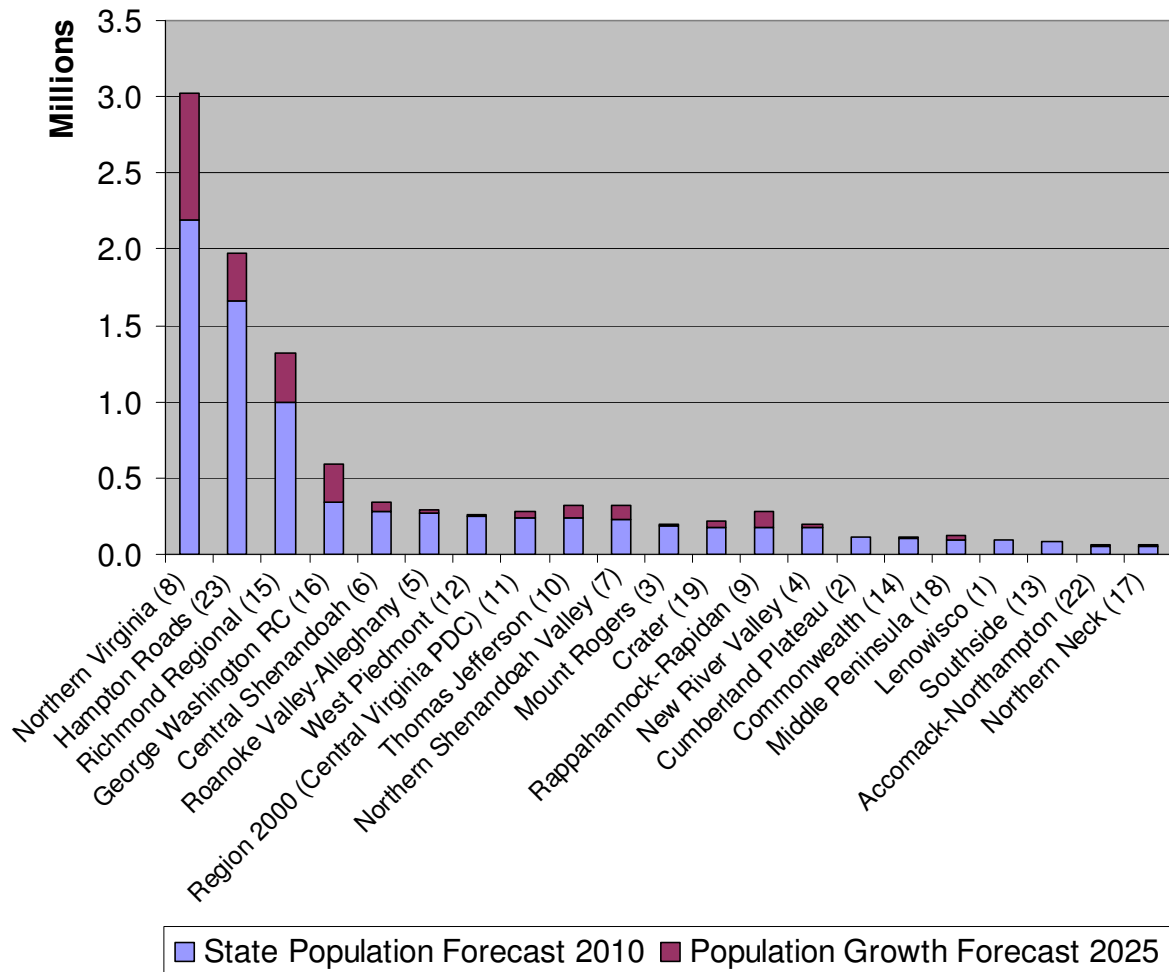
**Figure 6 - 8 Virginia Regions**  
(Source: *Virginia Performs*)

The state's primary role in employment growth is to provide the infrastructure – transportation, education and training, workforce development, and other public services – that reduces the transaction costs associated with economic activity. Adequate infrastructure enables private business, the engine of employment growth, to better respond to emerging economic opportunities. In addition, the state can assist in employment growth by fostering a competitive business climate.

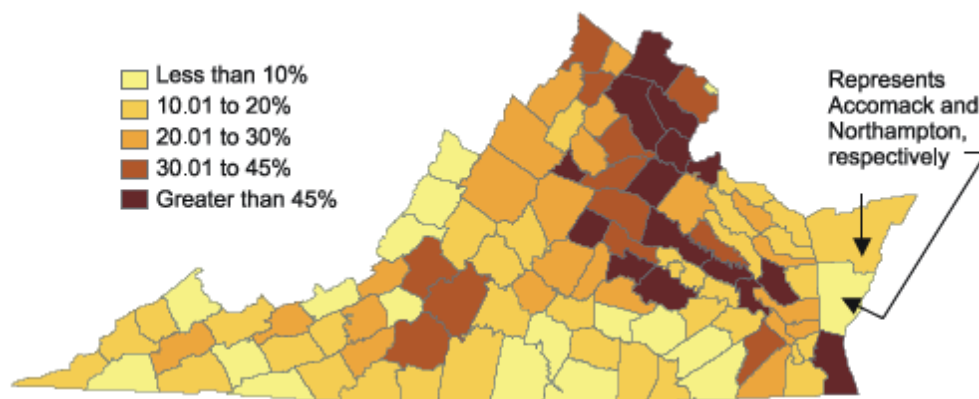
### 6.3.3. Growth Patterns within the Commonwealth

The Commonwealth is growing faster than the nation as a whole. Most of the growth is due to people immigrating into the state. They are drawn to Virginia because of economic opportunities in urban areas. Because of this migration, Virginia's major metropolitan areas are growing faster than the rest of the state. Two of every three Virginians now live in Northern Virginia, Richmond, or the Hampton Roads metropolitan areas. One out of every three Virginians reside in the Northern Virginia area. For the rest of the state, 70 percent of all localities have gained population while only 20 percent have lost population. Figure 6-9 provides estimated population growth for each of Virginia's planning districts. Figure 6-10 depicts the percentage increases for Virginia's counties.

## Planning District Commission



**Figure 6 - 9 Population by Planning District Commission from 2010 to 2025**  
 (Source: Virginia Transportation Research Council VTrans2035 Report, 2009)



**Figure 6 - 10 Projected Increase for Virginia County/City Population from 2000 to 2025**

(Source: Virginia Transportation Research Council, 2003)

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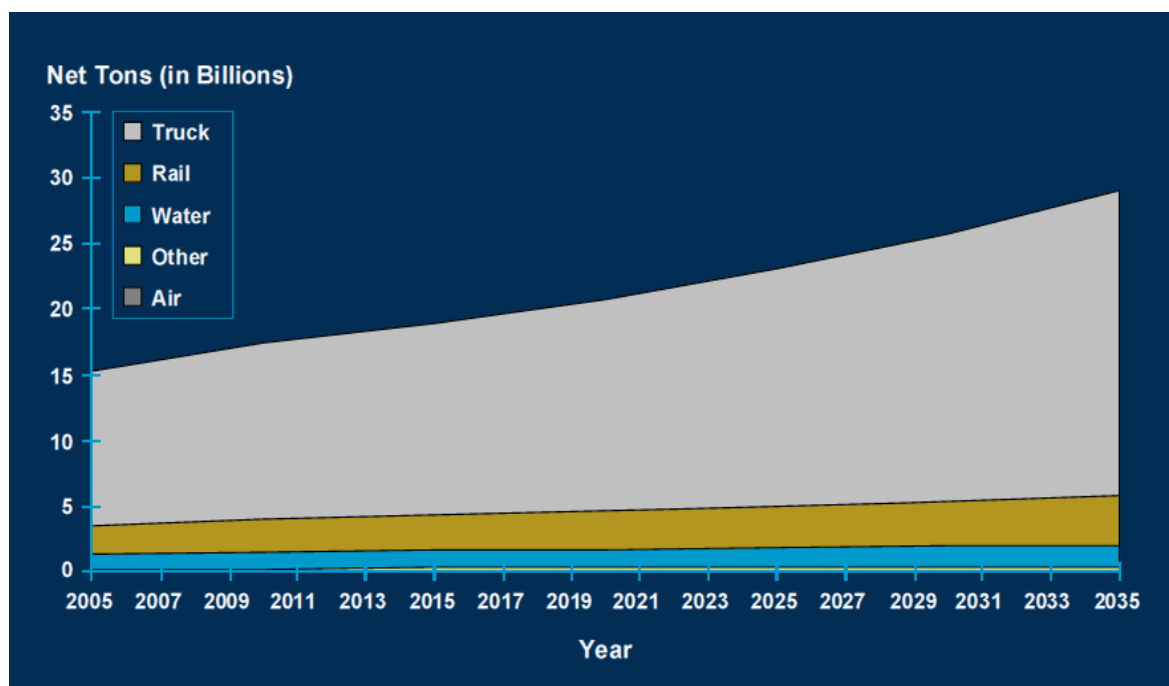


## 6.4. Freight

### 6.4.1. National Trends

Freight transportation has grown dramatically with the growth and spread of population and economic activity within the United States, and with increasing interdependence of economies across the globe brought about by foreign trade. A significant impact on transportation patterns and economic development has been brought about by the global use of containerized cargo for the shipment of goods by trucks, rail and large specialty container ships calling at major ports. The projected growth in cargo by transport modes is shown in Figure 6-11. Cargo in the nation is expected to double from 15 billion tons in 2005 to approximately 30 billion tons in 2035. Although the prediction shows the vast majority of freight being handled by trucks, highway congestion and the increasing cost of fuel make an increase in the percentage of modal shift between the truck and rail very probable. Figure 6-12 indicates the projected growth patterns in truck flows between 2005 and 2035, and Figure 6-13 indicates the projected growth patterns in rail flows between 2005 and 2035. As seen in Figure 6-12, the I-95, I-81 and I-64 highways between Richmond and Hampton Roads will carry an increasing number of trucks in future years.

Figures 6-14 and 6-15 depict the current and projected 2035 rail volumes compared to rail current capacity. It should be noted that the I-95 corridor is expected to be significantly impacted even for the rail volume in the AASHTO study, which likely projected a much lesser modal shift from highway to rail than the goals of this rail plan.



**Figure 6 - 11 U.S. Freight Tonnage by Mode 2005 – 2035**  
(Source: Cambridge Systematics)

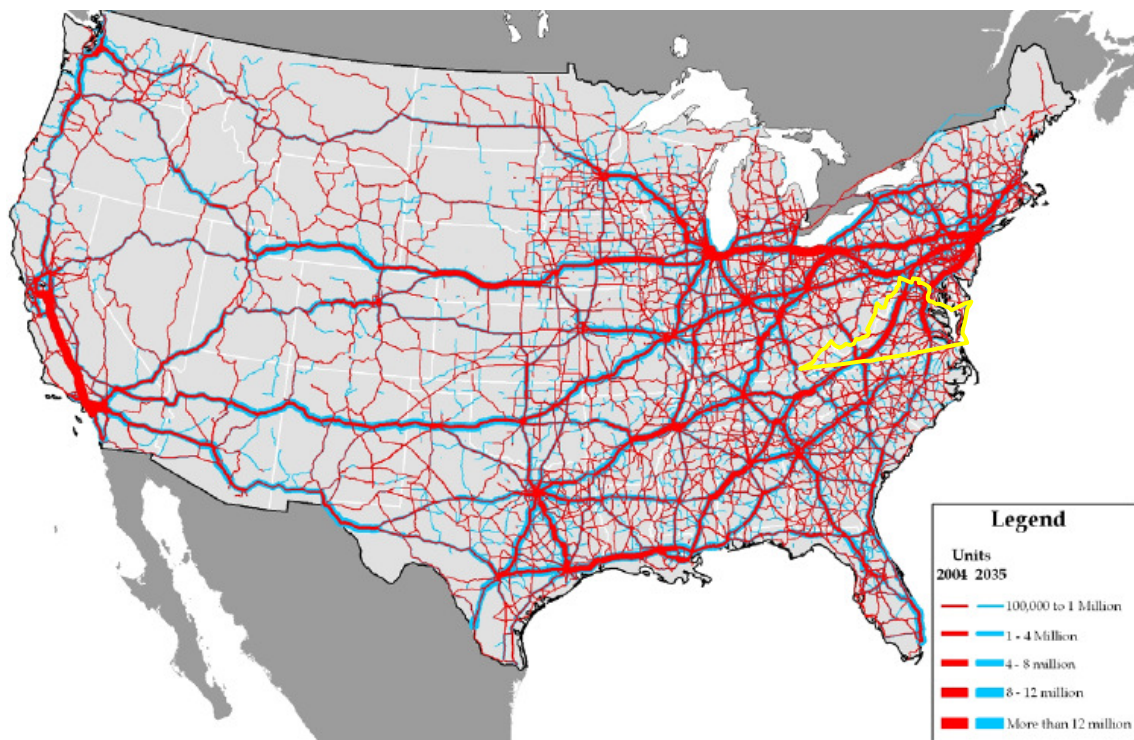


Figure 6 - 12 U.S. Truck Freight Flows 2005 – 2035

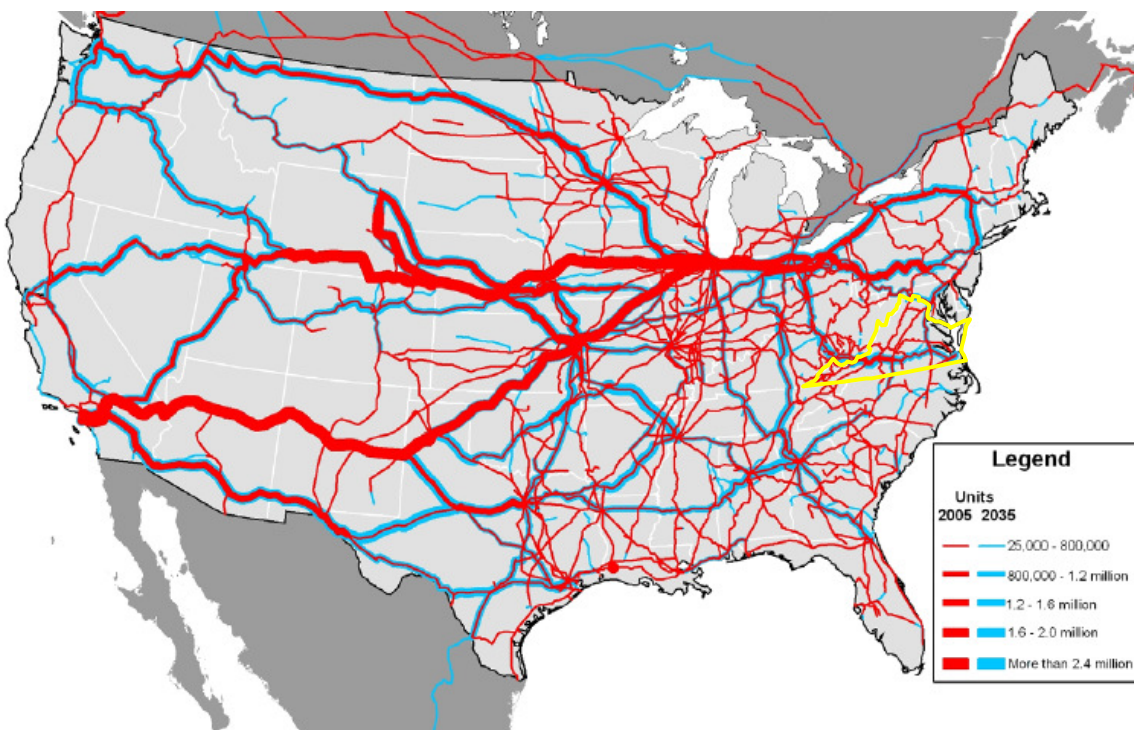
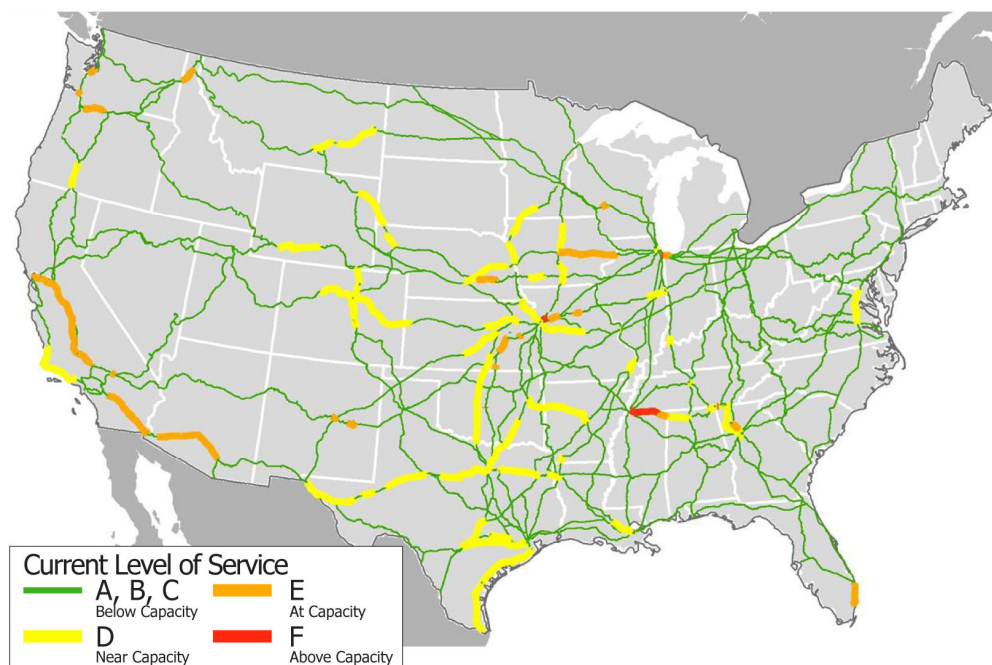
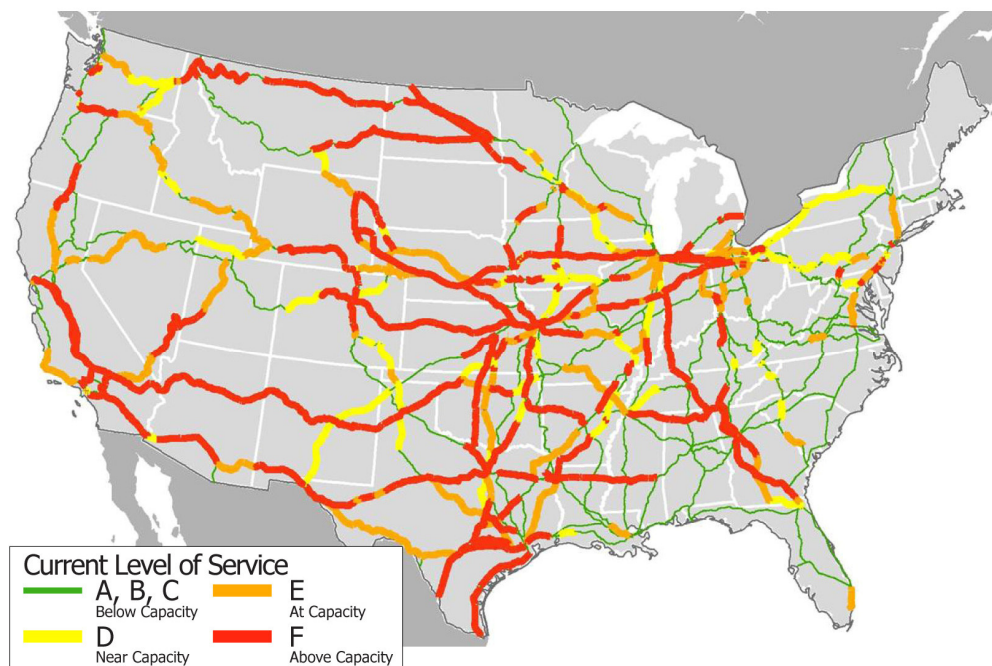


Figure 6 - 13 U.S. Rail Freight Flows 2005 – 2035



**Figure 6 - 14 Rail Current Volumes Compared to Current Capacity**  
(Source: AASHTO)



**Figure 6 - 15 Rail Future Volumes in 2035 Compared to Unimproved Capacity**  
(Source: AASHTO)

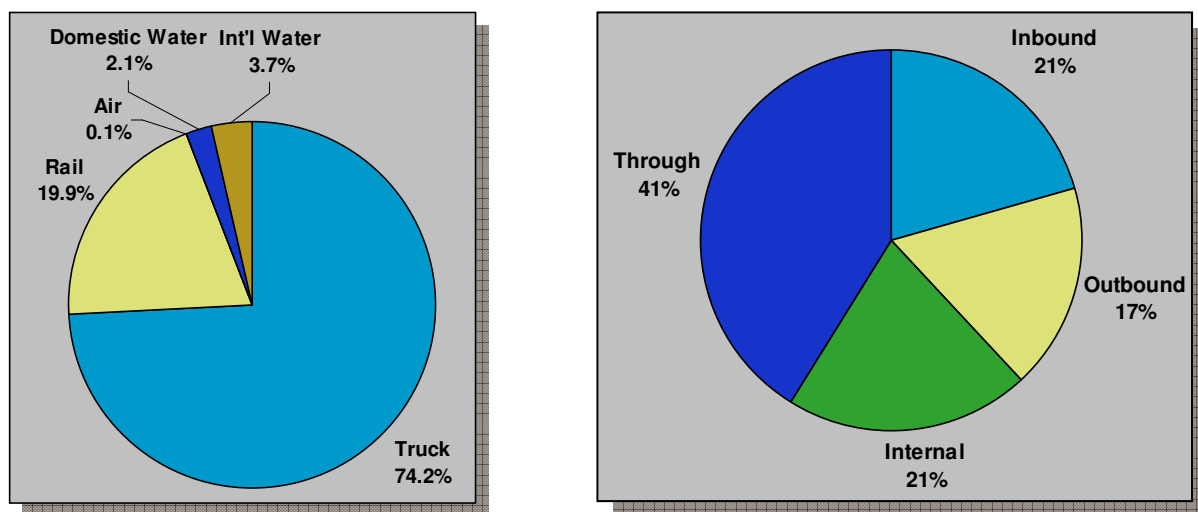


### 6.4.2. Virginia Trends

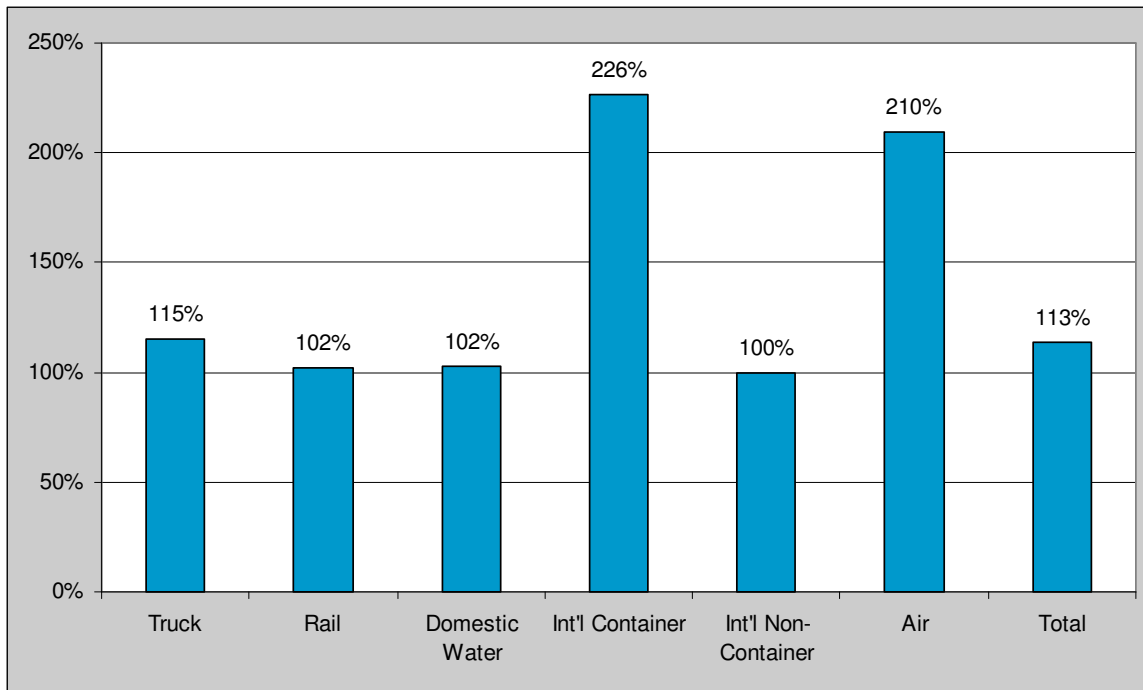
A detailed evaluation of freight movements in Virginia was recently completed by Cambridge Systematics for VDOT's Transportation and Mobility Division as part of the VTrans 2035 plan currently being developed. According to this study, the movement of freight – raw materials, intermediate products, and finished goods – currently supports over \$350 billion of Virginia's Gross State Product annually. To accommodate the movement of freight, Virginia hosts one of the nation's leading seaports, two national freight railroads, numerous local and regional railroads, four major cargo airports, and some of the nation's most heavily used truck corridors.

Over the next two decades, the forecast is for significant growth in the demand for freight movement into, out of, within, and through Virginia. Some of the Commonwealth's freight infrastructure is well positioned to accommodate this growth. But much of its infrastructure will be challenged – from normal wear and tear, from growth in the amount, type, and location of freight movement, from increased passenger traffic over shared highway and rail corridors, and from environmental pressures associated with higher freight volumes and/or denser settlement patterns in and around major freight facilities and corridors. Almost 80 percent of Virginia's freight tonnage has an origin or a destination in another state – including 40 percent which is simply passing through Virginia on its way to and from other states – so growth and freight improvements in other states, or the lack thereof, could significantly affect conditions in Virginia.

Today, around 50 percent of Virginia's output, 28 percent of its gross state product, and 34 percent of its employment are from freight-related industries that depend heavily on the movement of raw materials, intermediate goods, and/or finished products. The movement of existing freight tonnage by mode and direction are depicted in Figure 6-16. A projection of the increase in tonnage associated with each mode to 2035 is depicted in Figure 6-17.



**Figure 6 - 16 Virginia Freight Tonnage by Mode and Direction**

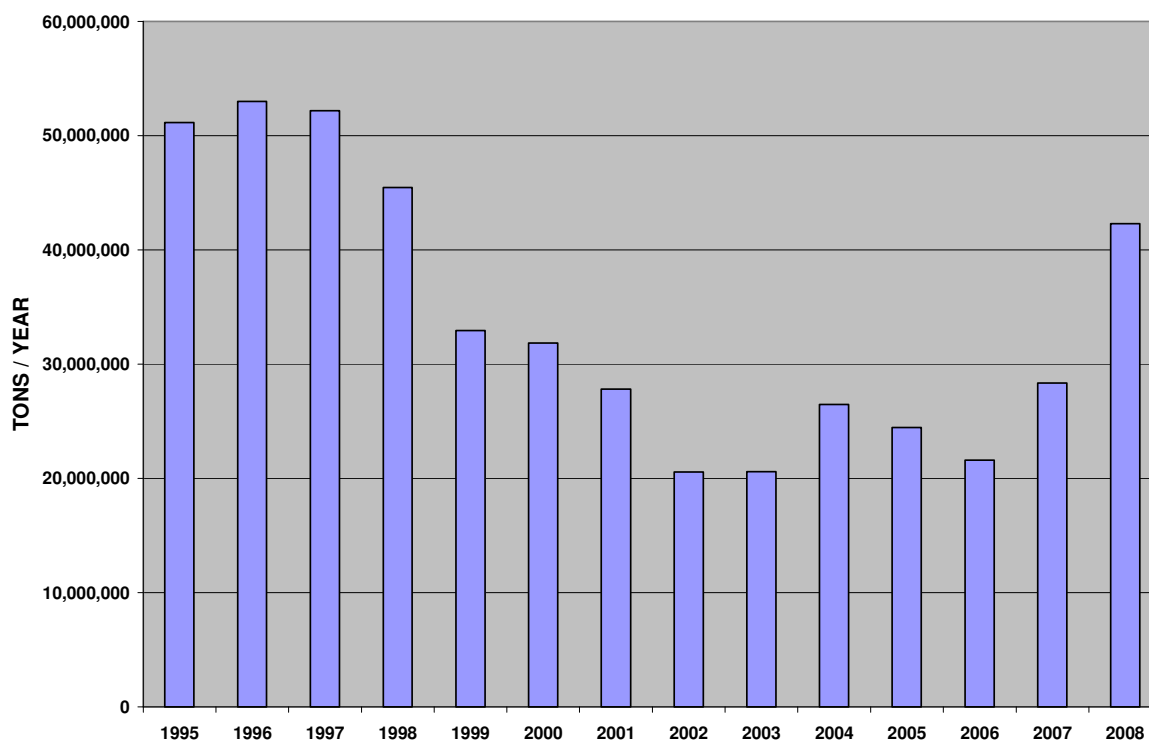


**Figure 6 - 17 Virginia Freight Projections by Mode (2035)**  
(Source: Cambridge Systematics)

A significant portion of the freight tonnage impacting the state rail system is coal from the Appalachian Coalfields in Southwestern Virginia to NS and CSX marine terminals in Hampton Roads for export, and intermodal containerized cargo exports and imports from the deepwater container ports of the Virginia Port Authority and the new APM Terminal in Hampton Roads.

#### 6.4.2.1. Coal Movements

After a period of relatively low coal exports, recent years have seen a rapid growth in coal exports due to increased global demand for coal, used primarily for electricity generation, in the face of soaring petroleum costs. Historic coal movements through Hampton Roads terminals are shown in Figure 6-18. The first quarter of 2008 had a 62% increase over the same period in 2007. The increased demand requires a corresponding increase in the number of freight trains needed to transfer the cargo.

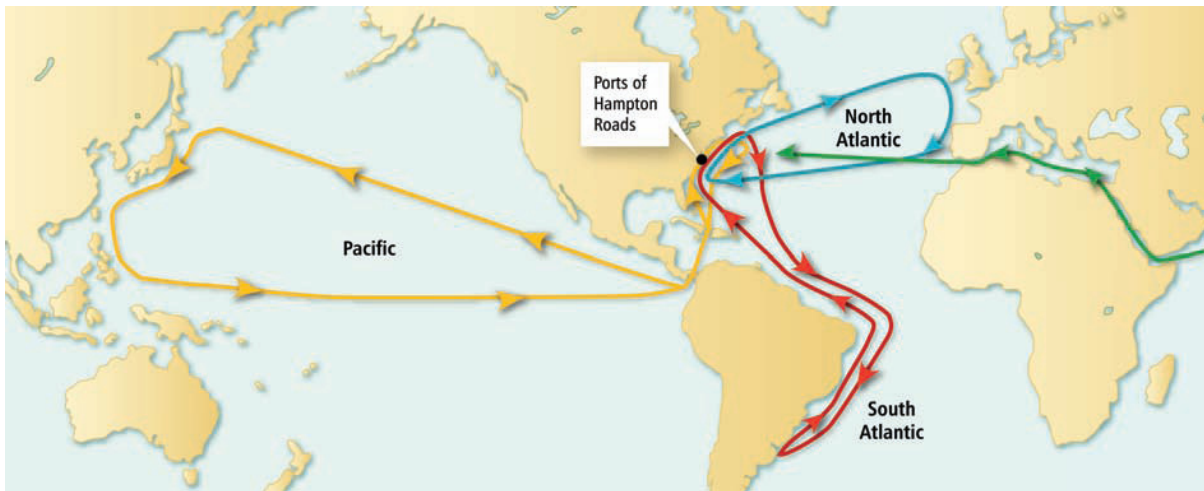


**Figure 6 - 18 Coal Shipments 1995 - 2008**  
(Source: Virginia Maritime Association)

#### 6.4.2.2. Containerized Cargo

Since its introduction in 1956, loading cargo into standardized boxes has revolutionized global shipping and economic development by reducing the cost of transportation between countries of the world. The evolution of transporting containerized cargo into larger and larger specialty containerships has brought economies of scale and the ability of “just-in-time” shipment of goods to companies in the U.S. and around the world.

Early container boxes were twenty feet long, but a variety of standard lengths are now available ranging from 40 feet, 48 feet, and 53 feet. Over 75 percent of the world container market consists of boxes that are 40 feet in length. As a unit of measurement, the world port industry adopted the use of a metric known as the “twenty-foot equivalent unit”, or TEU. A typical 40 foot container equals two TEUs. The new generation of containerships can carry 8,000 to 10,000 TEUs per vessel, but are so large that they can only be accommodated by port facilities with deepwater (50-55 foot deep channels) and large specialized container cranes to rapidly load and unload the vessel. Virginia is fortunate with its east access to the Atlantic sea lanes, 50-55 foot channels, and world class terminals at Norfolk International Terminals operated by the Virginia Port Authority, and the recently opened private APM Terminal in Hampton Roads. Global trade routes for Virginia are depicted in Figure 6-19.

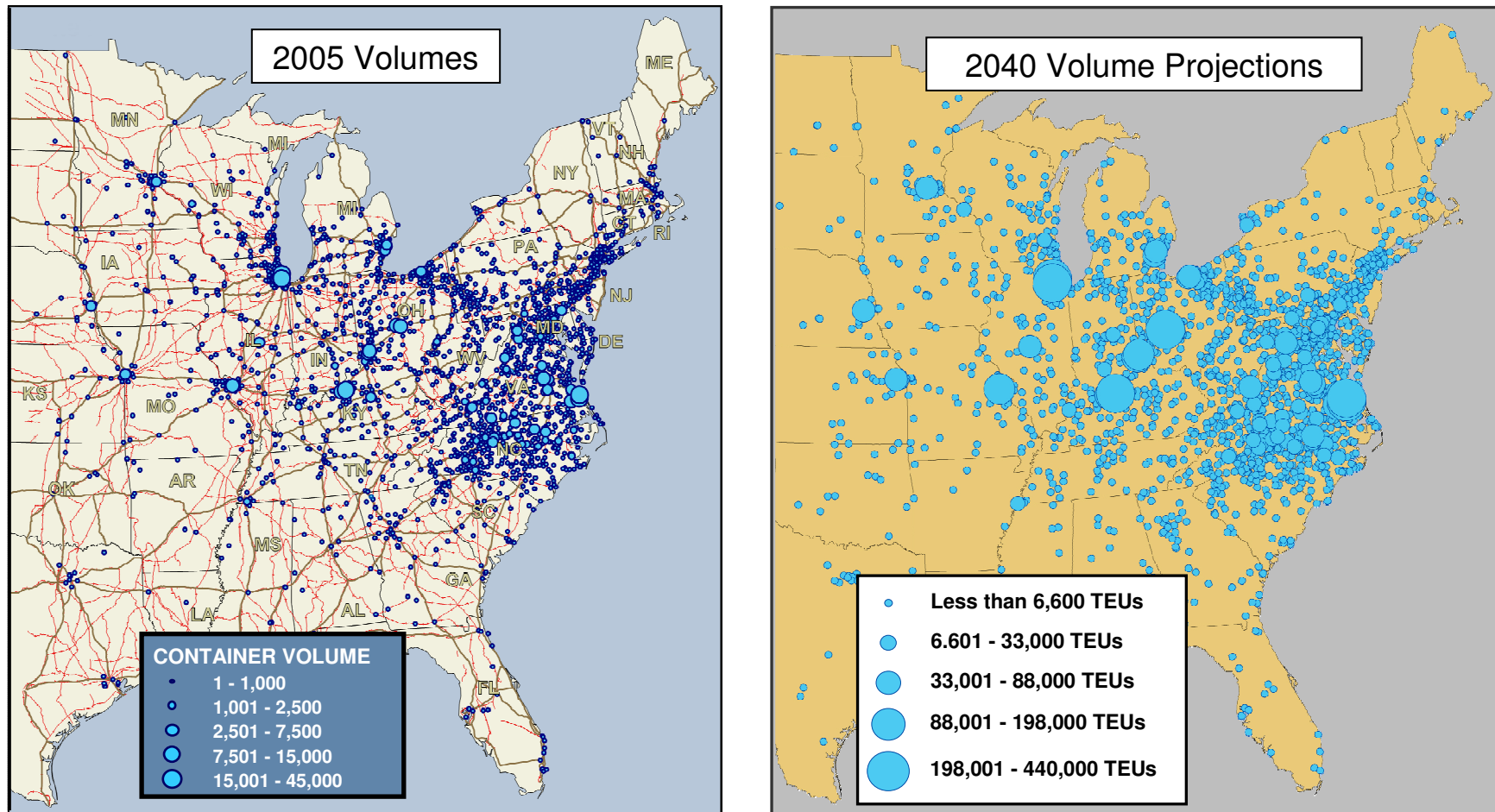


**Figure 6 - 19 Global Shipping Routes with the Ports of Hampton Roads**  
(Source: Virginia Port Authority)

In 2008 the Virginia Port Authority handled 2,083,278 TEU's of containerized cargo. Given the slowed pace of global trade in 2008, this represented a modest 2 percent increase over 2007 volumes. Historically, the Port has grown at an average of 8.0 percent per year, with a projected long term average growth of approximately 4.3 percent per year based on their 2040 master plan. A comparison of origins and destinations of containerized cargo moving to and from the Ports of Hampton Roads is depicted in Figure 6-20 for existing and 2040 cargo projections.

Containers shipped by rail in 2007, equaled 253,590, which represented a 5.1 percent increase in rail usage over 2006. Based on rail improvements at the Port (which will be discussed later), the percentage of containers handled by rail is expected to significantly increase in both the near-term and long-term.





**Figure 6 - 20 Container Volume Origins and Destinations for the Ports of Hampton Roads**  
(Source: Virginia Port Authority)

#### **6.4.3. Economic Development and Port - Rail Modal Interface**

In 2009 for the fourth straight year, Forbes.com has ranked Virginia the best place to do business in the nation. Forbes' index is based on a combination of business climate, labor, regulatory environment, economic climate, growth prospects, and quality of life. In this index, North Carolina ranked fifth, Maryland 12th, and Tennessee 23rd in the nation. In 2009, CNBC and CNBC.com ranked Virginia as the best state for business, based on 40 measures of competitiveness, North Carolina ranked 9<sup>th</sup>, Tennessee 20<sup>th</sup>, and Maryland 27<sup>th</sup> in the nation.

Almost 11,000 high-tech companies and thirty Fortune 1,000 firms are located in the state, contributing to Virginia's robust and growing economy. Rail transportation improvements provide direct economic benefits by reducing the costs of transportation, expanding the accessibility of businesses to suppliers, labor, and consumer markets, and attracting new entrepreneurial opportunities to a community or region. An efficient transportation network with rail access to major shipping and travel destinations in Virginia and nationwide is a powerful combination for potential economic development. The Virginia Port Authority estimates that over 60 million square feet of additional distribution center space will be needed over the next 25 years to keep pace with containerized exports and imports in Virginia. The Commonwealth's rail and highway transportation system allows companies to locate throughout the state – often in rural areas where land costs are less expensive and an available workforce is nearby.

Business climate is influenced by a number of factors, including the cost of labor, transportation, and energy; tax and regulatory burdens placed on businesses, and quality of life. Centrally located on the U.S. East Coast, Virginia's integrated transportation system of highways, railroads, airports and seaports ensures that businesses can reach all global markets and get shipments from suppliers more efficiently. Highlights on Virginia's transportation system include:

- Eleven railroads operate on more than 3,400 miles of railway in Virginia, of which more than 3,200 miles are Class I. Two of the nation's largest railroads operate in Virginia: CSX Corporation and Norfolk Southern Corporation, which is headquartered in Norfolk.
- Fourteen commercial airports serve Virginia, including two of the nation's busiest: Washington Dulles International and Ronald Reagan Washington National.
- The Port of Virginia offers world-class shipping facilities and a schedule of approximately 3,000 sailings annually to over 250 ports in 100 foreign countries. The Port, offering one of the largest intermodal networks on the East Coast, handled 2.08 million TEUs (Twenty-Foot Equivalent Units) in 2008, and moved more than 28% of its total business by rail. The new APM Terminal at Portsmouth opened in 2007 and will be a major container terminal on the East Coast.
- The Virginia Inland Port in Front Royal serves as a regional intermodal facility and acts as a collection point for containers from West Virginia, Ohio, Pennsylvania, Northern Virginia and elsewhere (Figure 6-21).
- The Port of Richmond is a multi-modal freight and distribution center located on the James River, adjacent to I-95, offering service to northern Europe, the United Kingdom,

Canada, Iceland, and upon inducement, to the Mediterranean, South America, Mexico, and the Caribbean.

- Virginia's highway system features more than 70,000 miles of interstate, primary and secondary roads, including six major interstate routes: I-95, I-85, I-81, I-77, I-66 and I-64.

Virginia offers six foreign trade zones designed to encourage businesses to participate in international trade by effectively eliminating or reducing customs duties. Also, numerous subzones are provided and additional ones can be designated to enhance the trade capabilities of specific companies.

Virginia's economic future depends on its ability to attract jobs, people, and businesses. The state must compete to draw top companies, grow the job market, and offer an exceptional quality of life that makes people want to call Virginia home. That is why the Commonwealth has identified strategies across all transportation modes to ensure people and goods can move freely throughout the state and continue to feed the economy.





**Figure 6 - 21 Economic Development near the Virginia Inland Port**  
(Source: Virginia Port Authority)

A key component of freight movement in Virginia is the more than 240 port-related distribution centers located throughout the Commonwealth. Figure 6-22 depicts the location of major distribution facilities, and highlights the location these of facilities occur throughout all regions of the Commonwealth – particularly near intermodal facilities, and where rail and highway access are good. Many of these distribution centers are also rail dependent for movement of containerized cargo that provides the goods that are imported or exported from the facility. These distribution centers not only house cargo, but also serve as transfer points for goods moving from the port to intended destinations. Since the mid-1990s, the square footage of these distribution centers has annually increased by almost 13 percent. Demand suggests that an additional 26 million square feet will be necessary by 2014 and could reach 60 million square feet by 2035.

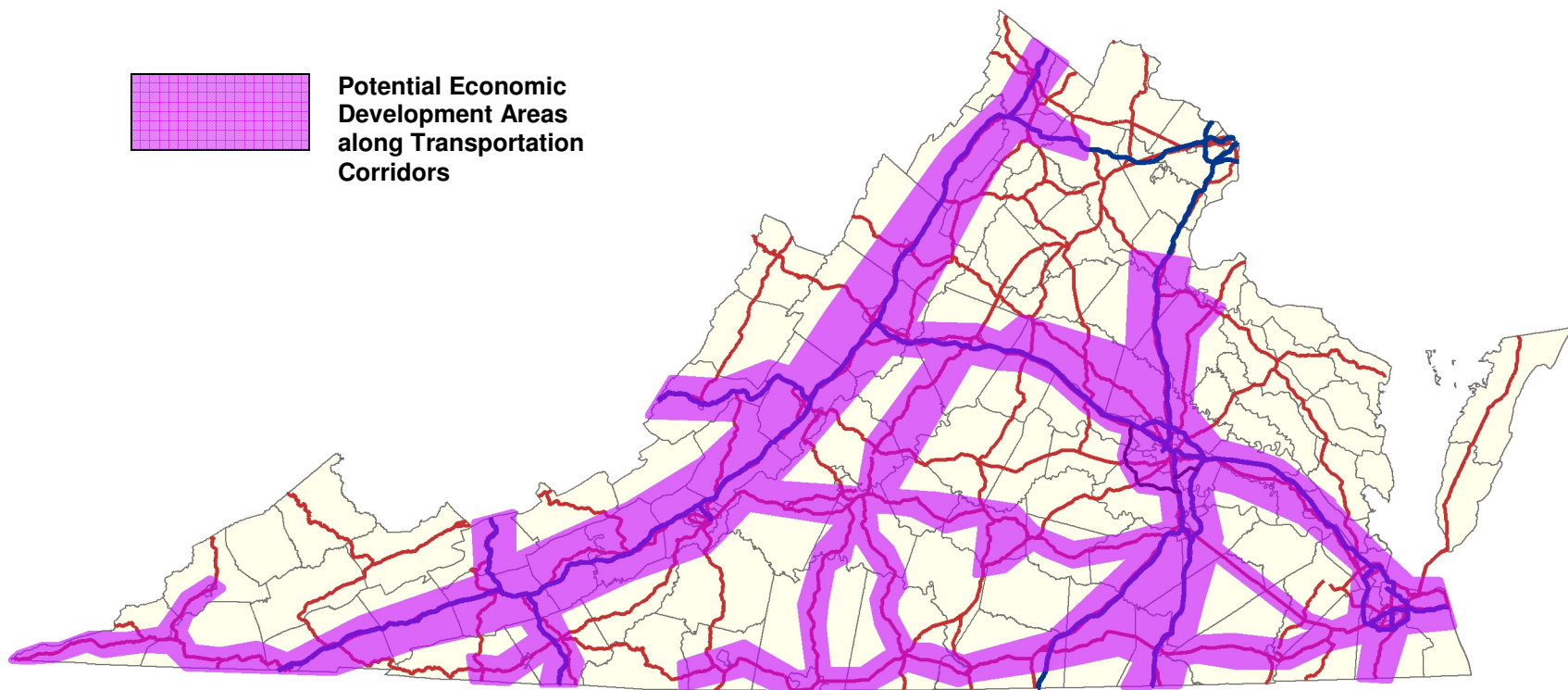
According to the Virginia Port Authority's 2008 Financial Report, the Port's success has generated huge economic benefits to the Commonwealth. Annually, port-related business provides over 343,000 jobs, \$13.5 billion in payroll revenues, and \$1.2 billion in local tax revenues. Since 1996, port-related warehousing and distribution investment has increased by over \$416 million and employed over 12,000 people in the Hampton Roads area alone. The Virginia Inland Port – an intermodal facility located in Front Royal and connected to the marine terminals by daily rail service - has stimulated the attraction of some 24 warehousing and distribution centers providing a total income of \$599 million with over 6 million square feet of space together with employee levels of over 7,000 workers, as shown in Figure 6-21. Household names like Wal-Mart, Target, Home Depot, Dollar Tree, Lillian Vernon, and Cost Plus have all set up distribution facilities in the Commonwealth in large measure due to the presence of world class port facilities coupled with good rail and highway access.

In late 2007, APM Terminals, a sister company of Maersk-Sealand shipping line, the largest shipping line in the world, completed Phase I Construction of a new \$600 million, 300 acre container terminal in Portsmouth. This marine terminal project is the largest investment in a company owned container terminal in the U.S. and is a huge investment in the Commonwealth's future. This is the first time that a shipping line has invested its own money to construct a marine terminal from the ground up. The terminal is expected to generate \$6.4 billion in economic impact to the Commonwealth over its first 15 years of operation.

Virginia's rail system with connections to the Ports of Hampton Roads, the Midwest, and Eastern Seaboard, has positioned many counties and municipalities in the Commonwealth to attract businesses with their associated economic development. Distribution facilities and intermodal rail facilities are particularly well suited to Virginia's transportation system. Larger companies are exploring the concept of large intermodal business parks with a central intermodal yard that could serve numerous manufacturing, warehousing, and distribution centers on the same site. Figure 6-23 represents a joint effort by the Virginia Economic Development Partnership and DRPT to identify transportation corridors near the rail system and other modal links that would be potentially attractive to businesses looking for development opportunities.

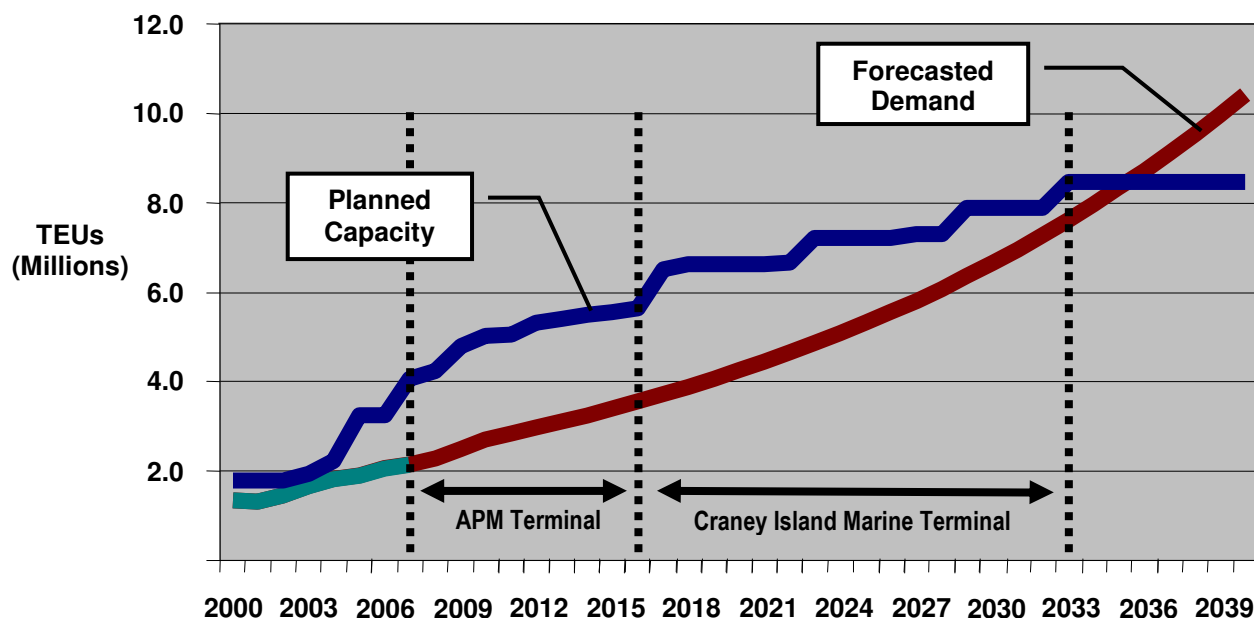






**Figure 6 - 23 Potential Economic Development Areas along Transportation Corridors**  
(Source: Virginia Economic Development Partnership)





**Figure 6 - 24 Increase of Containerized Cargo (TEUs) at Virginia Ports**

Over the next twenty years, containerized cargo volume is expected to triple, far exceeding the current capacity of the port network in the U.S. As depicted in Figure 6-24, the Port of Virginia has two unique opportunities to meet this growing demand by adding terminal capacity with the opening of the APM Terminal in 2007 and the proposed development of a new container terminal on the eastward side of Craney Island. VPA has estimated that the growth in container volumes would generate a need to develop 20-60 million square feet of supporting distribution center space in the Commonwealth.

Containerization has radically altered global trade and international production of goods has increasingly shifted to foreign countries where labor costs are lower. The economics of containerization have shaped global supply chains - which have benefitted some countries and left others on the sidelines. Shippers in the U.S. with state-of-the-art ports, deepwater terminals, and good land-transport infrastructure enjoy lower freight costs and lowered shipping times. Efficient ports - such as the Ports of Hampton Roads - with access to large flows of cargo, will receive large ships and frequent service, with trade connections to every part of the world.

Development of the needed rail infrastructure to support both coal exports and the container trade discussed above has been, and should continue to be a high priority for the Commonwealth.

## **6.5. Passenger Rail**

### **6.5.1. National Trends**

Numerous studies at the federal, state, multi-state coalition, Amtrak and industry group levels have been conducted in recent years. The unanimous consensus is that the nation is in critical need of efficient (on-time) and cost-effective intercity and long distance passenger rail service to relieve both highway and airport congestion, and that a strong federal role is needed to assist in the development of such a national rail system (similar to the large federal investments used to develop the interstate highway system and network of major public-use airports throughout the nation). The observations summarized below from the American Association of State Highway Officials (AASHTO) 2002 report entitled *Intercity Passenger Rail Transportation (2002)* are still valid and have grown in importance in the intervening years.

Intercity rail can be divided into two broad categories:

- “Corridor” services, that focus on shorter distance markets (100 to 500 miles) where intercity passenger rail can offer a travel time transportation option to aviation or driving a vehicle.
- “Long-distance” services that focus on markets (usually multi-state) where rail travel times can be very lengthy.

Corridor services dominate intercity passenger rail travel within the United States where about 81 percent of all intercity passenger trips (greater than 100 miles) are less than 500 miles. Corridor trips are generally characterized by:

- Short distances and travel times
- Frequent or regular travel
- Significant business travel market
- Many single-day round trips

Intercity passenger rail offers advantages in serving corridor markets, including:

- Direct service to and from densely developed central cities, which may otherwise involve either travel on congested highways, or long, unreliable access trips to and from airports located in suburban areas – particularly since 9/11 when airport security requirements have greatly increased the overall travel time to travel between cities.
- Providing service to and from communities not served by air.

Rail corridors offer a variety of potential economic benefits, particularly rail corridors that link metropolitan economies that have close economic ties, such as the Hampton Roads, Richmond and Washington, D.C. I-95/I-64 Transportation Corridor. It has been estimated that over 80 percent of the nation's population lives in a metropolitan area. Because of such population density, intercity passenger rail has the potential to provide growth and enhance regional economic competitiveness by:

- Direct Employment Benefits Due to Service Expansion
- Visitor Expenditures and Tourism
- Station or Terminal Development Impacts
- Government Revenues
- Amenity Gains (including needed capacity in congested highway corridors, fewer accidents, and reduced pollution emissions)
- Provide rapid emergency response in the event of a natural disaster requiring the movement of large volumes of people and for relief operations.

The long-distance passenger market is served by trains traveling distances greater than 500 miles, are usually multi-state, and operate with sleeping cars when traveling overnight. Long-distance trains are generally characterized by significantly longer average passenger trip length than those associated with corridor services.

In some cases long-distance trains also provide service in corridor markets; however, their schedule and primary function is oriented around the needs of the endpoint passenger. Such trains are generally scheduled to serve major cities and tourist destinations at attractive times, but most markets are limited to one round trip per day or even less than daily service.

Although long-distance trains capture a relatively small segment of the long-distance passenger market, they do occupy a critical role in the nation's overall rail and transportation network by providing:

- National Connectivity: Long-distance trains form most of the national network that links different intercity passenger rail services and markets throughout the United States.
- Essential Services: Many long-distance trains serve rural communities with limited or no significant air or bus service.
- Transportation System Redundancy: Long-distance trains provide an alternative form of travel during periods of severe weather conditions or emergencies that affect other modes of transportation.
- Mail and Express Deliveries: Most Amtrak long-distance routes carry a substantial amount of mail for the U.S. Postal Service, as well as other types of express freight.

### **6.5.2. Virginia Trends**

Virginia passenger rail trends and existing Amtrak and VRE passenger rail services mirror the national trends as noted above, and as noted in the various DRPT and Commonwealth transportation corridor studies previously discussed, identified the need for improved and increased passenger rail services in Virginia (both corridor and long-distance services). Increased passenger corridor services are required in the I-95/I-64 transportation corridor between Hampton Roads, Richmond, and Washington D.C.; in the I-81/Route 29 from Washington D.C. to Lynchburg/Danville as well as Roanoke/Bristol; and passenger rail connections between the megaregions of the Eastern U.S. and Virginia. Passenger rail projects identified to meet these needs include:

- I-95 Corridor - Washington, D.C. to Richmond: Higher speed and then high speed rail service
- I-64 / Rte 460 Corridor - Richmond to Hampton Roads: Higher speed rail on the existing Peninsula Route to Newport News, and then high speed rail service on either the Peninsula Route or a new Southside Route
- I-95 / I-85 Corridor - Richmond to Raleigh: Southeast High Speed Rail Corridor
- I-66 Corridor - VRE commuter rail extension from Manassas to Haymarket; and then westward to the Front Royal / Winchester region.
- Route 29 Corridor - VRE Commuter rail extension from Manassas Bealeton.
- I-95 Corridor - VRE Commuter Rail extension from Fredericksburg to Carmel Church
- I-81 / Route 460 Corridor – TransDominion Express (TDX): a new passenger rail service from Lynchburg to Roanoke to Bristol, Virginia.
- Route 460 / Route 360 Corridor – TransDominion Express (TDX): a new passenger rail service from Roanoke to Lynchburg to Richmond.
- Rte 29 Corridor – Lynchburg to Danville: Higher speed rail service
- Rail Stations / Transit Oriented Developments (TOD) – New passenger rail stations and TODs are anticipated for Cherry Hill, Sudley Manor, Gainesville, Haymarket, Bealeton, Fredericksburg, Carmel Church, Glen Allen / Staples Mill, Newport News, Roanoke, and modifications to Richmond’s Main Street Station.

## **6.6. High Speed Rail**

### **6.6.1. Background**

In the late 19th and early 20th centuries, passenger railways were the major form of mass transportation. Railway companies in the U.S. and Europe used streamlined trains from the early 1930’s for high speed services with an average speed of up to 80 mph and top speeds of more than 100 mph. With this service they were able to compete with airline travel at that time.

Following World War II, significant improvements to automobiles and aircraft placed personal transport within the means of most Americans. With severe antitrust restrictions on railroads and with government subsidization of interstate highways and airports, automobile

travel surged and passenger rail travel experienced a significant decline. In Europe and Japan, emphasis was given to rebuilding the railways after WWII, whereas in the U.S., emphasis was given to building a vast national interstate highway system and airports.

Urban mass transport systems in the United States were largely abandoned in favor of road expansion. Compared to Europe and Japan, U.S. passenger railways have been less competitive partly because the federal government has tended to encourage and fund road and air transportation. But today — as population grows and population density increases in major urban corridors, as highway and airline congestion increase and as energy costs increase — rail ridership is increasing across the country.

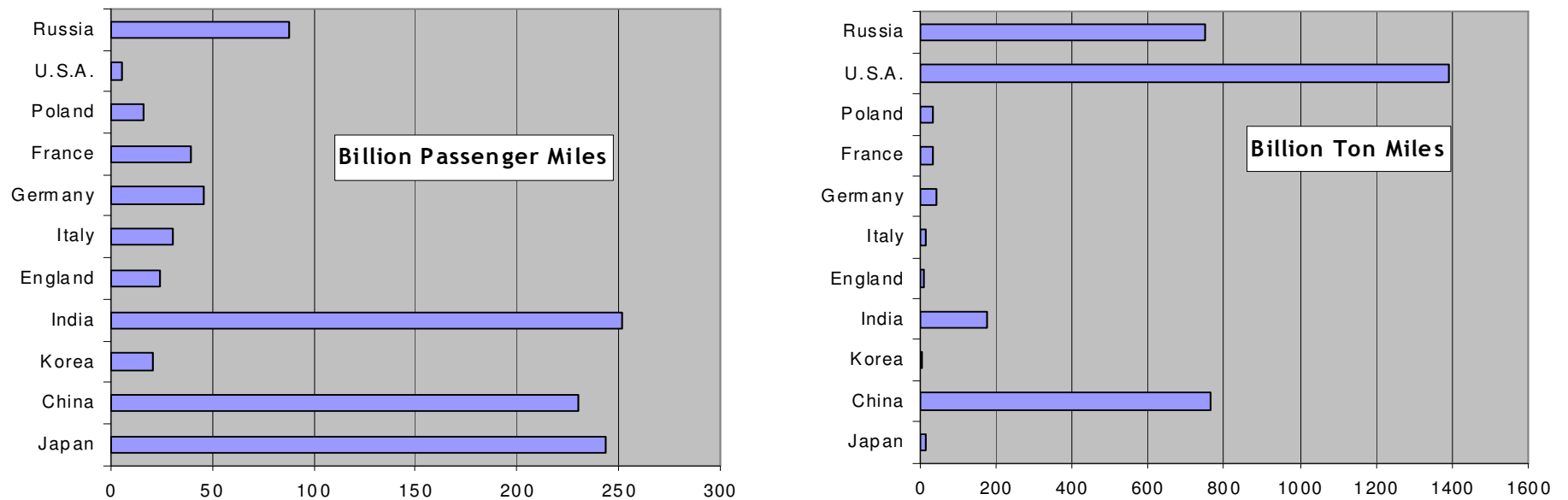
It is instructive to compare U.S. passenger and freight rail service with other major countries in the world (Figure 6-25). For other developed nations of the world, there is significantly more passenger rail ridership on rail lines than freight. Inversely, for the United States, there is significantly more freight hauled by rail than passenger rail. India has one of the highest uses of passenger rail (251 billion passenger-miles) and among the lowest usage of freight rail (175 billion ton-miles per year). The opposite is true for the U.S., where passenger rail use is low when compared with developed countries (six billion miles per year) but freight rail usage is the highest in the world (1,390 billion ton-miles per year).

High speed rail is primarily a type of passenger rail service that operates significantly faster than the normal speed of rail traffic. In the U.S., the FRA has established a threshold of 90 mph for high speed rail, whereas in Europe the threshold has been set at 124 mph. There are no single standards and lower speeds are often required even on a high speed corridor by local constraints.

The world's first "high speed train" service occurred in Japan, which started in 1964 with trains speeds of approximately 125 mph on the Tokyo–Nagoya– Kyoto–Osaka route. In Europe, the first high speed rail was Italy's 125 mph service in 1969. The only high speed rail service at present in the U.S. is Amtrak's Acela Express, which operates in the Northeast Corridor between Boston, MA, New York City and Washington, DC; it uses tilting trains to achieve speeds of up to 150 mph on existing tracks. While high speed rail is designed mainly for passenger travel, it also offers possibilities for freight service such as mail, overnight deliveries and other types of cargo.

High-speed rail tracks must have high-turn radii, be welded together and be extremely well-supported and anchored to avoid vibrations and other damage. The track itself in most cases is uninterrupted, with roads and other tracks crossing over bridges. Although most existing forms of high speed rail are electrically driven via overhead cables, other forms of propulsion, such as diesel locomotives, may be used — particularly the new generation of environmentally friendly and fuel- efficient diesel-electric locomotives. Magnetic levitation (maglev) trains are considered high speed rail; however, due to their unique track-oriented vehicles and their inability to operate on conventional railroads, they are usually considered a separate type of high speed transport system.

In 2002, the FRA designated 10 high speed corridors under Section 101 0 of the Intermodal Surface Transportation Act of 1991 (ISTEA) and Section 11 03(c) of the Transportation Efficiency Act for the 21st Century (TEA-21) for passenger rail service in high population density and congested intercity sections of the nation. This designation allows a corridor to receive specially targeted funding for highway-rail grade crossing safety improvements and recognizes the corridor as a potential center of high speed rail activity. These designated corridors are depicted in Figure 6-26. They include a high speed rail corridor from Washington, DC to Richmond and the Southeast High Speed Rail Corridor between Richmond and Charlotte, NC.



**Figure 6 - 25** Country Comparison of Passenger and Freight Rail  
(Source: Japanese Railways)





**Figure 6 - 26** FRA Designated High Speed Rail Corridors in the U.S.  
(Source: Federal Railroad Administration)



According to FRA, a number of states are planning high speed rail systems and making the necessary improvements. The technologies these states are planning to use typically involve upgrades of existing rail lines, rather than entirely new rail lines exclusively devoted to 150 to 200 mph trains, such as operate in Europe; or Japan or 250-300 mph maglev, such as planned in Germany and Japan. Amtrak has also offered to operate “Acela Regional” type service in other state-sponsored corridors if funds are made available for the necessary capital upgrades. In addition to upgrading a number of rail lines, California has prepared a business plan to potentially construct a 200 or 300 mph system.

### **6.6.2. High-Speed Rail in Virginia**

Fast, efficient passenger rail service is important for Virginia. The Commonwealth has initiated studies and preliminary design associated with high speed rail corridors passing through Virginia and has participated in Multi-State Coalitions looking at improving passenger rail services in the mid-Atlantic region. Because of the high capital cost associated with high speed rail systems, the Commonwealth has been following an incremental approach in past years to construct rail improvements that eliminate key rail chokepoints and to increase rail speeds and on-time performance on existing passenger rail corridors – particularly the I-95 and I-81 transportation corridors.

Bordering Virginia from Washington, DC to the north, is Amtrak’s 150 mph high speed Northeast Corridor. The Northeast Corridor has recently been extended northward from New York City to Boston, MA. This extension has proven that high speed passenger rail in the United States is a new stakeholder in the growth of America’s ground transportation system. Key considerations for high speed rail will be available funding and the development of capacity to support increased freight flows and safe operations.

The I-95 corridor has been identified as a priority corridor for high speed rail. The Southeast High Speed Rail (SEHSR) corridor would extend high speed rail service south from Washington, DC, to Richmond and on to Raleigh and Charlotte, NC. The SEHSR corridor would later expand further south from Charlotte, NC to New Orleans, LA via Atlanta, GA and from Raleigh, NC to Jacksonville, FL and east from Richmond to Hampton Roads. DRPT and the rail division of the North Carolina Department of Transportation have joined forces to support the planning and engineering of projects in Virginia and North Carolina.

The project length is approximately 168 miles, of which 99 miles are in Virginia. The capital cost of implementing the SEHSR will likely be a multi-billion dollar project. The Tier I Environmental Impact Study (EIS) of SEHSR ridership and fare structure indicated that the project would require no subsidies and would pay for itself in terms of annual operating costs. While the Tier I EIS ridership and revenue forecasts are positive, DRPT will take a more conservative approach in estimating ridership and revenue as the project progresses through the planning and engineering process. The next phase of the EIS preparation is currently underway and includes preliminary design of the system. This should be completed by 2011 at which time final design and construction could be initiated.

The American Recovery and Reinvestment Act (ARRA) of 2009 provided funding to the FRA for High-Speed Intercity Passenger Rail (HSIPR) projects. The Commonwealth of Virginia submitted on August 24, 2009 a track 1a application for final design and construction of 11 miles of third track for Arkendale to Powell’s Creek. The Commonwealth also submitted on October 2, 2009 a track 2 round 1 application for 19 individual projects that make up the Richmond to Washington DC I-95 Corridor phase I improvements for SEHSR.

In addition to the SEHSR Tier I EIS, DRPT is working to select the corridor's route alignment between Richmond's Main Street Station and Doswell. The actual route selection was not made in the SEHSR Tier I EIS and FRA requires an Environmental Assessment to select one of the two route options to continue through the federal planning process. Analysis to select the high speed rail route between Main St. Station and Doswell, comparing the Eastern route along the Buckingham Branch line and the Western route along the CSX line sections began in February 2008 and was completed in the Spring of 2009. On April 6, 2009, DRPT submitted a Decision Brief: Alternative Considered but Dismissed, Richmond to Doswell, VA. On May 19, 2009, the FRA wrote that "the Buckingham Branch has been shown to fail as a reasonable alternative and the FRA concurs that this alternative may be dismissed from further consideration".